Unit 1 / 30 Days

What is Technology?

Technology is the means by which people improve their life and their environment. All people use some type of technology in their everyday lives. Technology continues to develop and change because knowledge and people's wants and needs change. Formal knowledge can be identified in four major groups:

- Descriptive–describes the order and relationships between events and phenomena and includes language, mathematics, and logic.
- Scientific–describes the laws and basic principles which govern the physical world and includes the areas of life and physical sciences.
- Humanities–describes the relationships which have existed, should exist, or do exist between individuals and groups of people and includes the areas of history, sociology, philosophy, and psychology.
- Technology–describes the systems and practices developed by humans to extend their potential and includes technological areas such as production and transportation.

This unit will focus on the study of technology and the systems of technology. Students will learn how new technology is designed, produced, used, managed, and assessed. Students will use knowledge from these four actions as they complete the entire middle school / junior high school experience.

Technology is best described using a “systems” model. A system uses the inputs of people, finances, capital (such as machines and facilities), materials, knowledge, time, and energy. These inputs are used to design and produce desired outputs. Technologies are used, managed, and assessed on a daily basis. The desired applications result in a product, structure, or system. Samples include . . . .

TECHNOLOGICAL MEANS	APPLICATION OR PRODUCT
Bio-Technology / Agriculture	Better yields, new consumer products, etc.
Communication / Information	Exchange of ideas or information
Construction	Structures built on a specific site
Manufacturing	Production of consumer and industrial goods
Transportation	Movement of people and goods

The content and activities in this unit are designed to introduce students to technology and its major components. This will most likely be the first time the students have explored the topic of technology in an organized manner. It is critical that the content be presented with enthusiasm and with the strong conviction that technological literacy is critically important for every individual. Emphasis should be given to the importance of understanding technology . . . . remember, students will fulfill future roles as citizens, workers, employers, investors, consumers, and voters.

Objectives

Upon completing this unit each student will be able to:

- ✔ Define technology
- ✔ List and briefly explain an example of a technological system or context
- ✔ Describe the technological actions of designing, producing, using, and assessing actions
- ✔ Describe the need for technological literacy as each student takes their place in society as a . . . .
  - General citizen
  - Productive worker
  - Employer of other individuals
  - Consumer of the products and services of technological systems
  - Investor in enterprises which use technology
  - Voter on local, state, and national issues that relate to technology
- ✔ Explain a simple technological system highlighting the elements considered to be inputs, processes, outputs, and feedback
- ✔ Design, produce, use, and access technological systems and products

Proposed Schedule For The Unit

Day	Content / Activities
1-2	Complete the administrative details associated with starting a class Introduction to “technology” as a subject in today’s schools
3-5	Introduce technological evolution throughout history to the students
6-9	Cover examples of technological actions using a “systems” perspective
10	Review content of the course to date (class discussion, quiz, etc.)
11-14	Introduce the concept of design and it's link to modern technology
15-19	Introduce the nature of production by producing a product
20-21	Have the students package the manufactured good (i.e., the products)
22-24	Introduce the concept of using technology and technological systems
25-29	Address management and assessment of technological systems
30	Complete the unit (formal evaluation, etc.)

Outline For Unit #1

Day	Instructional Outline (Lessons / Activities / Notes)

1-2 Complete the administrative details associated with starting a class

1. Identify that this course will present the . . . . .
   - Study of technology throughout history
   - Systems of technology
   - Designing and problem solving in technology
   - Production techniques
   - Using and assessing technology
   - Impacts and spin-offs of products, systems, and structures
2. Clarify why it is important to understand technology
3. Identify and conduct an activity for the students to supplement the lesson, such as designing and testing a vehicle, developing a tri-fold flyer about the school or use the Internet to review famous inventors / inventions

3-5 Introduce technological evolution throughout history to the students

1. Show a time line of technology advancements based on the ages of technological developments
2. Identify how people have solved problems to improve life and increase human productivity.
   - Stone Age
   - Bronze Age
   - Iron Age
   - Agriculture-farming era
   - Industrial revolution
   - Information Age / service sector economy
3. Identify and conduct a simple activity to reinforce the topic, such as building models of a log cabin or an early automobile, printing a flyer with cold type, creating models of stone age tools, or determining how long it would take to travel to the state capitol via horse-drawn carriage

6-9 Cover technological actions using a “systems” perspective

1. Introduce the definition of technology systems
2. Present the elements of a technological systems model, focusing on . . . .
   - Inputs
   - Processes
   - Outputs
   - Feedback / evaluation
3. Define terms such as raw materials and standard stock as the inputs to a production-based system
4. Use a simple activity to illustrate the concept of a system, such as building a product using a teacher-directed assembly line

Day Instructional Outline (Lessons / Activities / Notes)

10 Review content of the course to date (class discussion, quiz, etc.)
1. Use a video to highlight key topics

11-14 Introduce the concept of design and it's link to modern technology that is based on a need, want, or opportunity by completing the following tasks:
1. Introduce design and problem solving and design
2. Outline the steps in a technological problem solving model, such as:
   - Identify the problem carefully and clearly
   - Secure all necessary information about the problem
   - Develop potential solutions (rough sketching)
   - Evaluate ideas and select a few of the best designs
   - Refine the selected designs (refined sketching)
   - Evaluate the developed solution
   - Choose the optimal design
   - Document the optimal design
   - Seek approval of the design / solution
3. Describe how market and consumer research impacts a design
4. Identify how models, mock-ups, and prototypes assist in problem solving and design efforts
5. Describe examples of how design is applied to technological problems
   - Radio / television programs, newspapers, magazine covers
   - Roads, bridges, neighborhood buildings, homes
   - Space shuttle, interstate highway system, local traffic control
   - Other
6. Use a simple media design assignment to supplement the lesson
   - Storyboard and videotaping a commercial
   - Prepare a flyer that promotes the study of technology (and include digital images of facilities or student work in the media)
   - Contrast an “early” printing technique with a modern process

15-19 Introduce the nature of production and modern technology by producing a product or examining structures
1. Describe the term “production” as applied to technology
2. Present the requirement for production systems . . . .
   - People
   - Knowledge / information
   - Materials
   - Money
   - Time
   - Energy
3. Highlight the processing of resources in a manufacturing facility . . . .
   - Casting and molding

Day Instructional Outline (Lessons / Activities / Notes)

- Forming
- Separating
- Conditioning
- Assembling
- Finishing

4. Highlight processes associated with construction work . . . .
   - Site work / preparation
   - Foundations
   - Building projects (i.e., superstructures or equivalent)
     - ✔ Civil
     - ✔ Residential
     - ✔ Light commercial
     - ✔ Industrial
   - Finish work
   - Landscaping
5. Use a video to supplement this introduction to modern production
6. Have teams design and create a prototype of a board game (on a standard sheet of poster board) complete with game pieces, a set of directions, dice or spinner, etc.
   - The theme of the game should be related to a common technological system or process (such as "Traveling the Interstate Highways of America" or "Building A Skyscraper")
   - Use color markers or pencils, or computers with color printers to create the graphics on the board
   - Highlight the interdisciplinary links such as creating a printed set of directions for the game (which involves language arts skills)

20-21 Highlight the importance of packaging manufactured goods (products)

1. Have the students design a container for the game developed above
2. Package the new products in an attractive manner
   Note: An interdisciplinary link to social studies would be add labeling in multiple languages to the graphics on the container

22-24 Introduce the concept of using technology and technological systems

1. Introduce the selection process for technological products / services
2. Present ways to evaluate / assess technological products:
   - Does it meet personal needs?
   - Is it affordable?
   - What operational requirements are there?
   - What service and maintenance requirements are expected?
   - Can it be operated safely?
   - Other

Day Instructional Outline (Lessons / Activities / Notes)

3. Challenge the students to think about "where do I learn about technological devices?"
   - Broadcast advertising
   - Brochures and other print media
   - Internet sites
   - Owners manuals
   - Other
4. Use on-line search engines to find sites that illustrate "how" modern gadgets and systems work
   Note: Require students to create a written or oral report over a modern device or process (which aligns with language arts skills)

25-29 Address the assessment of technological systems with the class

1. Evaluate the impacts of a technology on the environment
   - Resources used by the technology
   - By-products of the technology
   - Waste disposal of the technology and / or its by-products
   - Other
2. Evaluate the affect of a technology on people with a brief lecture
3. Discuss how a technology impacts society / nationalities
4. Organize an activity that helps students assess an environmental issue or problem in the community. Examples include;
   - Determine how to best deal with scrap in your labs or general waste in your school
   - Study how to filter liquids to remove waste
   - Develop and explain a recycling plan for the community (or, better yet, implement the new program!)
   - Other

30 Complete the unit with some type of formal evaluation

Evaluation

Students may be evaluated on these actions and related criteria . . . .

- ✔ Participation in classroom and laboratory activities
- ✔ Efforts in the design and production activities
- ✔ Media developed (documentation, graphics, etc.)
- ✔ Quality of products / media
- ✔ Scores on teacher-created tests and quizzes

Unit 2 (or Unit 3) / 30 Days

Impacts of Technology

We are all directly and indirectly impacted by technology. Technological systems are used to communicate information and personal messages, to produce goods and constructed works, and to move people and freight. Further, we are dependent upon technological devices and systems at home, in the work place, and at play. We also are in a position to make decisions on the appropriateness of technological systems, such as supporting or condemning area landfills, coal-fired electric power generation, highway development, and annexation of land for residential and commercial usage.

Today, it is not enough to just understand how the various technological systems work. Each citizen must realize that today's devices and systems have both benefits and hazards. Modern technology is the result of a variety of compromises and trade-offs. For instance, the desire for clean air requires that coal-fired generating plants install devices to remove sulfur and other emissions from their smokestack outputs. While we have the electricity needed for daily affairs there is also an increased cost of operation; and therefore, higher electricity bills for the consumer. There is a constant debate between how clean the air should be versus the expense of generating power at a cost that people can't afford. This is but one example of the trade-offs (impacts versus benefits) which we face each day.

This unit will give students an opportunity to study a variety of questions concerning modern technology and how it impacts us. Several of the topics include . . .

- The building of homes in rural areas (i.e., urban sprawl) versus saving precious farmland and wooded areas
- The level of quality versus the costs to maintain tighter tolerances, better efficiency, or higher performance standards
- The automating of production to reduce costs versus more unemployment
- The participation in public forums concerning local civil construction projects
- The corporate responsibility to consumers (accuracy in advertising, fairness, product reliability, etc.)
- The support for "green" initiatives in the region

The need for educated, technologically literate citizens should be emphasized throughout this unit. The students should also be reminded of the reality that there are "no easy answers" to complex technological problems.

As a special note to instructors, this unit has been developed to be the "second" topic in a Middle School program scenario. However, if your school's course called TECHNOLOGY is divided among only two grades (i.e., for a Junior High School) this topic should be the third and final unit offered during the initial year of the program.

Objectives

Upon completing this unit each student will be able to:

- ✔ Describe technological decisions as a balanced series of trade-offs
- ✔ List and describe the consequences, both beneficial and adverse, of various technological solutions / problems impacting people and the environment
- ✔ Develop a recycling program, or evaluate a current recycling program
- ✔ Examine the consequences of air and water pollution and describe their effects upon the community.
- ✔ Develop an “impact time line” for technological products
- ✔ Conduct a research project and arrive at an informed conclusion
- ✔ Use technology to design, construct, produce, model, or assess a solution to an environmental issue that was originally created by technology

Proposed Schedule For The Unit

Day	Content / Activities
1-3	Introduce how technology impacts individuals, society, and the environment
4-5	Cover the personal impacts of technology
6-8	Introduce how to select devices and systems with concern for others
9-10	Review what it takes to make informed decisions
11-15	Cover the relationship of technology and the environment
16-17	Explore the purpose for and design of landfills (i.e., dealing with solid waste)
18-20	Challenge students with several “what do you choose?” scenarios
21-27	Implement a lesson that shows how students and society can head toward a cleaner, healthier future
28-29	Explore how students can adjust to change
30	Conclude the unit with some form of evaluation

Outline For Unit #2 (or #3)

Day	Instructional Outline (Lessons / Activities / Notes)

1-3 Introduce how technology impacts individuals, society, and the environment

1. Describe selected impacts of technology throughout history
2. Cover various types of impacts / consequences
   - Planned versus unplanned
   - Desirable versus undesirable
   - Immediate versus delayed
3. Identify how technologies are assessed (individually, by local or national agencies, private consumer groups, etc.)
4. Identify several examples of a local individual's or group's decision regarding a technology and it's consequences . . . . . such as a local traffic engineering change, approval of a business or industrial site, or a new subdivision and the resulting change in school population and vehicular traffic around the neighborhood
5. Challenge the students in the class to label these significant changes as "positive" or "not so positive" or "neutral"
6. Outline the steps in a technological assessment completed by a local or federal agency (from websites or publicly released documents)

4-5 Cover the personal impacts of technology

1. Address how individual decisions have consequences for society and the environment, such as . . . .
   - Whether to liter the roadside or not
   - Decisions to buy (or use) one product or service over another
   - Supporting or not supporting certain transportation services (mass transit, overnight delivery firms, etc.)
   - How violent computer games might influence youngsters
2. Emphasize the personal benefits of technology
   - Personal goods or services
   - Mobility
   - Protection / shelter
   - Information / education
   - Entertainment / amusement
3. Have students make and defend a local (personal) decision based on need or desire, costs, function, environmental factors, etc. Examples might include . . . .
   - Buying products sold only in non-returnable containers
   - Driving a vehicle while talking on a cell phone
   - Supporting or avoiding firms that advertise during certain TV shows
   - Turning down offers (from friends) for pirated software or media
   - Coming to school using mass transportation versus individual vehicles

Day Instructional Outline (Lessons / Activities / Notes)

6-8 Introduce how to select devices and systems with concern for others

1. Outline how technologies often have unintended influence on others with a video or brief presentation
2. Have the students explore trends in product use or impacts by creating an impact time-line or related graphic for various local scenarios . . .
   - If a new factory opens in your town, what will happen to local schools, traffic patterns, shopping outlets, etc.?
   - How long does it take an item to decompose in a landfill?
   - If you only buy items in disposable containers and packaging, what might happen? How soon?
   - What happens when you pour hazardous fluids down the drain?
   - Cite how a vehicle's routine maintenance relates to fuel economy
   - Trace the planned life-cycle for a typical kitchen appliance (and how the item is disposed of properly by the consumer or a retailer)

9-10 Review what it takes to make informed decisions

1. Explain how research and experimentation help groups and corporations make informed decisions
2. Provide a scenario, then allow small teams of students to investigate how some of the better applications developed . . .
   - Spin-offs from NASA such as the joystick
   - Special fabrics, like the breathable materials used in athletic wear
   - Lasers in medicine, weaponry, etc.
   - Digital technologies (good: computers; bad; viruses)
   - Chemicals for agricultural needs
   - Water purification plants
3. Have the groups report their findings from their research, including the benefits and unfortunate consequences

11-15 Cover the relationship of technology and the environment

1. Differentiate (i.e., clarify) the natural versus human-built environment
2. Identify how technology protects the environment
   - Scrubbers for smokestacks
   - Flood control dams
   - Hybrid engines (to reduce harmful automobile exhausts)
   - Others
3. Outline governmental regulations (which agencies are responsible for protection of various areas, how do laws and codes work, etc.)
   - EPA
   - OSHA
   - Urban planning commissions / commercial development boards
   - Other local and state agencies

Day Instructional Outline (Lessons / Activities / Notes)

4. Research companies that turn “trash” into useful products, such as firms that chop-up waste plastic and build park benches or similar items
5. Conduct a recycling activity . . . make products from various waste in the school (scrap paper, aluminum cans, trash from the T.E. department, etc.)

16-17 Explore the purpose for and design of landfills (i.e., dealing with solid waste)

1. Explain the nature of landfills (design, operation, etc.) for the disposal of solid materials
2. Identify the location of area landfills . . . where does “your” trash go? Note: There are many interdisciplinary links to earth science here!
3. Use a video, posters, or invite a guest speaker to highlight the issue of waste disposal in your community
4. Identify the economics of waste disposal (how much does it cost a home, the local town, or school to have trash hauled away each day or week?)

18-20 Challenge students with several “what do you choose?” scenarios

1. Identify the “good, the bad, and the ugly” of technology
   - Technology is basically neutral
   - All technologies used by people and industries result in an “impact”
   - Consequences can be good or bad
   - Most modern technologies have both good and bad consequences
2. Note how technology can directly impact our global society
   - Values (i.e., what society thinks is important)
   - Laws (or what society demands from people and groups)
   - Aspirations (how society people together see the future)

21-27 Implement a lesson that shows how students and society can head toward a cleaner, healthier future

1. Outline challenges to the local community (i.e., challenge the students to identify concerns for the immediate region)
2. Develop plans for positive impacts related to technology and residential and / or industrial growth, such as . . . .
   - Beautify a city, area lot, or neighborhood
   - Noise control (from local highways, near an industry or airport, etc.)
   - Judgment of new industry and jobs versus industrial waste, exhaust, land usage for construction, etc.
   - Seeking new businesses and heavy industry for larger tax base
   - Controls on communication (programming content) over the airwaves
   - Review the traffic patterns around the school (for safety or efficiency)
   - Management of water usage in the community
   - Other
3. Select one or more of these challenges (see above) and organize small

Day Instructional Outline (Lessons / Activities / Notes)

groups to review the scenario by following these steps . . .
- Study the "problem" and propose a plan or action
- Create a presentation complete with visuals
- Schedule a formal presentation with an appropriate audience

28-29 Explore how students can adjust to change

1. As a wrap-up to the unit, note how technology impacts all individuals . . .
   - People work to improve that which can be changed
   - Realizing that sometimes things can not be changed (for a variety of
   - legal, technical, political, or other reasons)
   - Continue to be more informed / understanding about impacts
   - Become more involved in governmental actions
     - ✔ Attend hearings/briefings
     - ✔ Correspond with elected officials to voice opinions
     - ✔ Use the Internet to gain access to reliable information
   - Support for various not-for-profit groups / ventures
     - ✔ Highway clean-up
     - ✔ Participate in tox-a-way days
     - ✔ Neighborhood watch
     - ✔ Supporting the use of mass transit
   - Accepting the wishes of the majority by following laws or rules
   - Involvement in governmental actions
2. Encourage students to take part in their community, professional and civic organizations, associations related to a career, etc.
   Note: There are many opportunities for service learning in this unit

30 Conclude the unit with an appropriate means of evaluation
Instructor's note: If your school uses a middle school format, this may be the last day of the Technology course for the academic year for the students

Evaluation

Students may be evaluated on these actions and related criteria . . . .

- ✔ Participation in classroom and laboratory activities
- ✔ Completion of worksheets, forms, handouts
- ✔ Developed of plans, documentation, etc. related to assessment issues
- ✔ Research into assigned topics
- ✔ Identifying appropriate means of preserving resources and the environment
- ✔ Formal presentation over assigned topics
- ✔ Scores on teacher-created tests and quizzes

Unit 3 (or Unit 2) / 30 Days

Resources Of Technology

Technology and its complex devices and systems have evolved from the crude tools of early people. From the very beginning of recorded history, humans have had to protect themselves from nature and various enemies. Early tools and weapons were developed to help people adapt to their environment and provide food, shelter, recreation, and safety. Physical instruments plus knowledge (through experience or shared ideas) helped civilizations grow and flourish.

This unit is designed to acquaint students with the technological resources necessary for technological development: people, information, materials, tools and machines, energy, capital, and time. Students will learn how these resources are unique in their relationship toward meeting human needs and how these resources are combined to help improve to our world.

During this unit, the historical development of tools, machines, and structures will be studied along with how they help shape today's world. Students will learn how human needs and desires can provide the basis for the development of new systems and gadgets that will drive tomorrow's technologies.

The six simple machines (lever, wheel, pulley, inclined plane, screw, and wedge) will be introduced and demonstrated. Emphasis will be placed on the significance of these simple machines in the development of today's technological marvels. This unit will also provide students with an opportunity to learn how to safely use common hand tools and simple machines in the production of specific products.

Finally, the students will explore the role that materials, energy, and information have played in the growth of technology. The students will be introduced to the concept that resources can be combined with procedures and products to produce efficient products, structures, media, and systems.

Objectives

Upon completing this unit each student will be able to:

- ✔ List and explain the common resources used to develop solutions that address technological problems and opportunities
- ✔ Explain the impact of the early stages of tool and machine development
- ✔ Describe the six basic machines and provide examples of how modern tools use each of the six machines
- ✔ Construct simple products using tools, machines, and raw materials
- ✔ List and describe the classifications of material resources

Proposed Schedule For The Unit

Day	Content / Activities
1-3	Introduction the resources (inputs) that are common to technological systems
4	Explain simple machines
5-8	Cover modern tools and machines
9-10	Introduce the historical development of materials
11-15	Cover the applications of energy / power in modern technology
16-18	Introduce knowledge and information as a “resource”
19-20	Address capital as an important resource in technological ventures
21-23	Review how time is one of our most precious resource
24-25	Describe people (management, labor, etc.) as the most important resource
25-29	Review the link between resources and responsibility in a global society
30	Complete the unit with an appropriate evaluation

Outline For Unit #3 (or #2)

Day	Instructional Outline (Lessons / Activities / Notes)
1-3	Introduction the resources (inputs) that are common to technological systems

1. Common inputs include . . .
   - Tools and machines
   - Materials
   - Energy
   - Information / knowledge
   - Capital
   - Time
   - People / labor
2. Describe how these resources / inputs work collectively in modern day technological applications (construction sites, factories, airports, mining, commercial districts, schools, etc.)
3. Identify how the demand of technology and systems develops from people's needs / desires

Day Instructional Outline (Lessons / Activities / Notes)

4. Outline how people provide the necessary labor for the application of technology . . .
   - Managers / Owners
   - Scientists
   - Engineers
   - Technicians
   - Workers
   - Others
5. Describe the historical development of tools and machines
   - Bronze Age
   - Iron Age
   - Agriculture (up through the early 1800s)
   - Industrial Revolution (1800s to 1960s)
   - Information Age (1960s to present)
   - Recent applications in bio-technologies & medical technologies
     Note: This lesson can be enhanced with assistance from a social studies or history teacher
6. Have the student explore the evolution of machinery by using hand tools or equipment from different periods (comparing the technologies)

4 Explain simple machines

1. Outline the nature and function of the basic machines
   - Lever
   - Wheel and axle
   - Pulley
   - Inclined plane
   - Screw
   - Wedge
2. Show examples of current day tools and machines that have evolved from the six simple machines
3. Challenge students to identify appliances and tools from home that include one of more of the basic machines
   Note: This topic features many direct linkages with the study of science, as it involves force, work, and other physics concepts

5-8 Cover modern tools and machines

1. Identify and demonstrate the tools and equipment necessary for the production of a simple manufactured good
   Instructional note: This may be the first time that students have been introduced to the variety of tools and equipment in the T.E. facility to take time to adequately review the resources in the school
2. Provide an overview of measuring and layout tools

Day Instructional Outline (Lessons / Activities / Notes)

3. Discuss and demonstrate various methods of preparing and assembling materials
4. Have the students individually build a simple (3-5 part) product or participate in a simple production run (completing one or more steps when building a small product)

9-10 Introduce the historical development of materials

1. Review the historical development of tools and machines and outline how specific materials have changed during the ages
2. Identify the four classifications of engineered resources . . . . .
   - Metals
   - Ceramics
   - Composites
   - Polymers
3. Outline the common properties of materials . . . and pointing out that many engineered resources are created with one or more of these properties for specific applications
   - Physical
   - Mechanical
   - Chemical
   - Thermal
   - Electrical and magnetic
   - Optical
   - Acoustical
4. Identify and point out the various materials available for students in the classroom (This will vary by program but should include various woods, sheet metal, composite board, and various plastics)
5. Show a video about material resources

11-15 Cover the applications of energy / power in modern technology

1. Note that energy allows us to do work and create movement
2. Identify the difference between key terms: energy, power, work, etc.
3. Identify the common forms of energy . .
   - Mechanical
   - Electrical
   - Light
   - Heat
   - Chemical
   - Sound
   - Nuclear (atomic)

   Note: Highlight the obvious links to science during this lesson
4. Outline the difference in renewable and nonrenewable sources

Day Instructional Outline (Lessons / Activities / Notes)

5. Cite examples of energy resources as “inputs” to technological systems
   - Fossil fuels (oil, coal, etc.)
   - Wind
   - Sun (light)
   - Water (hydraulic)
   - Nuclear (atomic)
   - Plants (trees, bio-mass, etc.)
   - Animals and animal by-products
   - Other
6. Schedule and conduct an energy-related activity (create a solar cooker, build a small battery powered device, model a waterwheel, etc.)

16-18 Introduce knowledge and information as a “resource”

1. Introduce different forms of information
   - Text (written and published works)
   - Graphics / symbols
   - Technical documentation
   - Speech
   - Music
   - Other
2. Highlight the mental tasks of ideation, brainstorming, creativity, etc. in our modern technological world
3. Cover how information and knowledge are important in technological ventures, including . . .
   - Technical books and publications
   - Computer databases
   - Scientific principles that apply to technological systems
   - Recorded media (CDs, tapes, etc.)
   - Engineering drawings
   - Financial records
   - Human innovation / ideation / creativity of managers and labor
   - Simulation software
   - Other
4. Outline why knowledge and information are necessary for technological development (R&D work, experimentation, product innovation, trouble-shooting, etc.)
5. Explore the technical information available in your local library or media center
6. Have students complete an Internet search on a technical topic, then prepare a report (share) what information they discover . . . . topics might include the variety of PDAs on the market, types of digital cameras, biotech firms (what they do or produce), a unique type of vehicle, etc.

Day Instructional Outline (Lessons / Activities / Notes)

19-20 Address capital as an important resource in technological ventures

1. Outline the various forms of "capital"
   - Cash / money
   - Supplies
   - Buildings
   - Equipment
   - Land
   - Vehicles
2. Describe how technological ventures are financed, such as:
   - Personal finance (i.e., from your own savings)
   - Loans
   - Sale of stock
   - Sale of products or services
3. Detail the expenses / costs of operating technology-based projects . . .
   - Materials and supplies
   - Utilities
   - Labor / management.
   - Equipment
   - Structures (facilities)
   - Insurance
   - Advertising
   - Taxes
   - Transportation / shipping
   - Profits (distribution of stock dividends, etc.)
4. Have the students assess the physical plant of your school building, a local shopping center, or nearby sports / recreation complex . . . . what things help describe the "capital" requirements of the operation?
   Note: This topic has many links to mathematics, from pricing to inventory to overhead costs to property values to accounting / bookkeeping

21-23 Review how time is one of our most precious resources

1. Introduce units of time with various examples
   - Standard clocks (seconds, minutes, hours, etc.)
   - Cycles (e.g., the moon circling the earth in 28 days)
   - Seasonal changes
   - The "academic year" at a school
   - First, second, and third shift at a factory
   - Other
2. Describe the technological reasons for precise time measurement, including flight schedules, production plans, navigation though space, etc.
   Note: Mention the importance of universal (or military) time based on the Greenwich Mean Time in transportation and global commerce

Day Instructional Outline (Lessons / Activities / Notes)

3. Discuss time limits on projects, completing assignments, in various competitive situations with others, etc.
4. Challenge the students to perform a task with little time available to complete the assignment . . . such as draw a picture of your school building in 2 minutes or trying to assemble a small product in 3 minutes or less (noting the obvious difficulty in completing the task)
5. Contrast the (a) pressures to complete the tasks and the (b) obvious sacrifice in quality or attention to detail
6. Challenge the students to determine ways to make a small group project "run smoother" or more efficiently through planning and organizational skills, such as a competitive event where the students must design, package, or document something

24-25 Describe people (management, labor, etc.) as the most important resource

1. Describe owners, workers, managers, bosses, team captains, group leaders, etc. as a key resource in any organization . . . . including industrial firms, social groups, and sports teams, etc.
2. Site examples of famous individuals related to technology:
   - Inventors (Bell, Edison, the Wright brothers)
   - Scientists (Einstein, Volta, etc.)
   - Corporate figures (Gates, Jobs, Iacocca, etc.)
   - Political (President John Kennedy calling for manned flight to the moon by "the end of the decade" or Congress approving the F 117 Stealth fighter project, which was done with the greatest of secrecy)
   - Other
3. Organize and conduct a problem solving competition. . . . challenge members of the class to display their brainstorming, design, and productive skills
   Instructor's note: The ability of students might also be reflected through a colorful poster or display board which illustrates the problem solving efforts used by the student to develop an appropriate solution
4. Cite the organization or cooperativeness of the winning teams as opposed to the groups that took longer
3. Use the Internet to explore the biographies of members of the Board of Directors of Fortune 500 companies, noting the education and previous experiences of these successful individuals

25-29 Review the link between resources and responsibility in a global society

1. Explain the various methods of conserving resources . . . perhaps listing observations on the board (in the classroom)
2. Determine which suggestions can be implemented in your classroom or lab, such as reducing the volume of paper, plastic, lumber, etc,

Day Instructional Outline (Lessons / Activities / Notes)

3. Provide a scenario, then allow small teams of students to investigate how some of the better technological applications have developed . . .
   - Spin-offs from NASA such as the joystick
   - Special fabrics and substances (like the breathable materials used in athletics or the high-tech materials in running shoes)
   - Lasers in medicine, surveying work, weaponry, etc.
   - Digital technologies (cameras, cell phones, wireless networks, etc.)
   - Chemicals for agricultural needs
   - Water purification plant
4. Have the groups report their findings, including the benefits and unfortunate consequences

30 Complete the unit with an appropriate means of evaluation
1. Develop and administer a quiz or test
2. Complete tasks around the classroom and laboratory to conclude the unit
   Instructor's note: If your school uses a junior high school format, this may be the last day of the Technology course for the academic year for the students

Evaluation

Students may be evaluated on these actions and related criteria . . . .

- ✔ Participation in classroom and laboratory activities
- ✔ Completion of worksheets, forms, handouts, etc.
- ✔ Research into assigned topics
- ✔ Effort in developing or applying information discovered through research and investigation
- ✔ Formal or informal presentation over assigned topics
- ✔ Scores on teacher-created tests and quizzes

Unit 4 / 30 Days

Developing Technology

Technology is the result of purposeful actions, often starting as a creative thought or an insightful observation. Typically, an innovative person or energized group will identify an opportunity or a problem needing a solution. A technology is then developed to meet the problem or address the opportunity. A number of techniques are used to develop or apply a technology. These include research, experimentation, innovation, invention, trouble-shooting, and design activities.

Technological devices, systems, and processes originate following three familiar scenarios. One is problem solving, another is design, and a third is engineering. Humans use these activities many times each day. Frequently a problem is addressed in an unconscious way, such as determining what's wrong with a table lamp that doesn't work (e.g., is it due to a burned out light bulb or a faulty switch?). Design work results in creative media, useful consumer appliances, and innovative packaging. Other times the problem solving and design process can be very complex and involve systems developed with great precision and scientific know-how. As an example, it took thousands of engineers and millions of hours of design work to develop the current space shuttle program.

People use technological problem-solving processes to satisfy their physical and emotional needs and wants. Design and problem solving is to technology what the scientific method is to the study of the natural world. Problem solving, whether it is designing, producing, using, or assessing a technology, follows a series of similar steps to arrive at a solution.

During this unit the students will explore techniques used to develop technological devices, processes, and systems. They will learn how to apply models of a problem solving process so that they will learn the technique for addressing future challenges. The key to success in Unit 4 starts prior to implementing the actual subject matter outlined here. Each instructor must determine how this unit fits into the over-all course. Several scenarios include . . . . .

- Unit 4 is offered as a stand-alone part of the Technology experience, with the focus of design content and activities unique to this part of the T.E. program
- Plan to have the students design a product or piece of media during Unit 4 that will serve as the focus of student work later in the Technology experience (such as developing a simple consumer good that will be mass produced during the Unit 5 on manufacturing or media that might be printed during the communication unit)
- Introduce design during the first few days of the unit then use the remaining time to focus on a group problem solving or engineering project (e.g., a FIRST Robotics or Rube Goldberg-style activity)

Objectives

Upon completing this unit each student will be able to:

- ✔ List and explain the processes involved with problem solving, design, innovation, and engineering
- ✔ Explain a problem solving process with a model
- ✔ Identify and describe a problem that needs a technological solution
- ✔ Prepare technical documentation related to brainstorming, preliminary design work, evaluation, implementation, and project approval
- ✔ Develop and refine several solutions to a technological problem
- ✔ Develop and test a model of a solution to a technological problem
- ✔ Create a successful solution to an engineering challenge

Proposed Schedule For The Unit

Day	Content / Activities
1	Introduce technology's influence on individuals, society, and the environment
2-5	Cover the major steps in technological problem solving
6	Describe the techniques used for gathering information (through research, experimentation, etc,)
7-15	Cover how alternative solutions are developed and documented
16-18	Introduce the process of refining and "optimizing" ideas
19-20	Cover how to evaluate and present design suggestions
21-23	Introduce modeling techniques
24-26	Review various means of specifying solutions for final approval
27-30	Applying the design process

Outline For Unit #4

Day	Instructional Outline (Lessons / Activities / Notes)
1	Introduce the unit by covering the impact of technological problem solving in a global society 1. Review the types of technological-based problems / opportunities used by

Day Instructional Outline (Lessons / Activities / Notes)

individuals and corporations, noting the impacts by these three areas . .
- Individual (i.e., personal)
- Societal
- Environmental

2. Highlight examples of personal needs
   - Physical needs
   - Emotional needs
   - Need to adjust
3. Add to the discussion the needs of entire societies / nations
   - Political
   - Educational
   - Community / neighborhood
   - Economic
   - Religious
4. Highlight the importance of environmental issues
   - Resource utilization
   - System efficiency
   - Protection of the environment
5. Discuss how technologies are developed to improve and control nature (perhaps using a short video to emphasize your points or explore famous civil engineering projects using the Internet)

2-5 Cover the major steps in technological problem solving
Special note to instructors: Too often, different techniques or processes are used throughout the T.E. program . . . be sure that the problem solving model introduced here matches the one found in the class textbook or used elsewhere in the curriculum

1. Emphasize the goals of problem solving (addressing opportunities, solving annoying problems, etc.)
2. Problem solving (including design and engineering) as a linear or cyclical process, so describe the need for using a “successful approach”
3. Communicate a structured design process, such as . . . .
   a. Defining the problem
   b. Gathering information
   c. Developing possible solutions
   d. Selecting the most promising solutions
   e. Refining selected solutions
   f. Testing (evaluation) design solutions
   g. Selecting the best solution
   h. Interpreting the solution (documentation, etc.)
   i. Presenting the solution for approval

   Instructional note: Challenges to properly identifying the problem / issue

Day Instructional Outline (Lessons / Activities / Notes)

vary considerably, so highlight these key points . . .
- State the problem clearly and accurately
- Keep your statement general rather than restrictive
- Will all people understand your problem statement?
- Determine who or what will be affected by your stated problem?
- Where will this be used?
- Consider the wide variety of restrictions that may exist
- Identify styling themes if appropriate
- Identify desired results

4. As time permits, challenge students (individually or in small teams) to devise effective solutions to these issues . . .
   - During the Holiday shopping season the traffic is terrible around malls and certain downtown business districts . . . what can be done about the congestion?
   - A local manufacturing business has had a reduction in orders . . . what can be done to improve sales?
   - A school corporation wants to consolidate two elementary schools into one . . . . what factors must be considered in planning the action?
   - A school has some prime property it is not using (ideas anyone?)
   - Build a tabletop device that performs a sequence of steps (pops three balloons at different locations, sets off two mouse traps five seconds apart, will launch a ping pong ball the farthest, etc.)
     Instructional note: Other scenarios can be taken from articles in local newspapers, from student-generated concerns, or conditions / issues around the school

6 Describe the techniques used for gathering information (through research, experimentation, etc,)

1. Provide examples of gathering data / information / knowledge
   - Technical research and development\
   - Laboratory experimentation
   - Internet search engines
   - Other
2. Demonstrate how to find resources within the school
   - Textbooks, reference materials, and similar print materials
   - Technology classroom
   - Library / media center
3. Challenge students to research a technological gadget, a modern system, or process used in business or industry

7-15 Cover how alternate solutions are developed and documented

1. Review the problem solving process, highlighting a common design and

Day Instructional Outline (Lessons / Activities / Notes)

development phase

2. Introduce various types of documentation
   - Text
   - Graphics (charts, illustrations, artwork, electronic clipart)
   - Engineering materials (blueprints, exploded views, renderings)
   - Computer modeling (animation, 3-D models, data files)
   - Physical models (mock-ups, prototypes, models)
3. Run a "mini lesson" on sketching and technical drawing for approximately 4-6 days, addressing how to develop orthographic views, isometric illustrations, add dimensions, and related topics (keeping in mind the types of illustrations that might be required later in the Technology experience)
   a. Technical sketching should be introduced with students developing their illustrations on graph paper (1/4" grid or isometric forms)
   b. Address the challenge that industrial designers face on a routine basis as they "visualize" sizes and features, then must prepare drawings or models of their ideas
4. Using the theme, category, or area of focus identified for the unit, initiate the (a) problem identification, (b) research, and (c) documentation phase with the class, including these steps . . . .
   a. Have the students work individually or in small groups
   b. Monitor the design work for effort, quality, and practicality
   c. Each student or team should prepare adequate technical illustrations, a bill of materials, or similar items

16-18 Introduce the process of refining and "optimizing" ideas

1. Review the completed documentation (which should largely be the result of student brainstorming plus initial development efforts)
2. Work with each student or team to enhance the designs, including . . .
   - Often times, when materials are to be cut out of 4' x 8' sheets, sizes can be altered to allow for a better use of materials
   - When designs involve wooden dowels or sections of electrical conduit, the lengths might be changed to minimize the waste as shorter pieces are cut from the longer rods / tubing
   - Some types of materials can not be processed in your school's facilities (due to limited equipment or budgets), so you may have to select alternative resources
3. Once the designs have been reviewed, make appropriate suggestions and have the students up-date their documentation (drawings, etc.)

19-20 Cover how to evaluate and present design suggestions

1. Schedule time for each design to be introduced to the class
2. Have the students prepare for their presentations (print-out drawings,

Day Instructional Outline (Lessons / Activities / Notes)

gather research, etc. so all materials are ready should questions arise)

3. Have the students provide a brief presentation and obtain suggestions from their peers
4. Allow time for the students to "enhance" their designs as appropriate
   Instructional note: The presentation should be evaluated so grade the student's performance and provide feedback on how well they did during this important step of the design process

21-23 Introduce modeling techniques and have the students prepare physical mock-ups of their new designs

1. Demonstrate the use of Styrofoam (i.e., hot wire) cutters, paper cutters or shears, utility knives, or other model utensils
2. Cover additional safety and laboratory guidelines concerning equipment and supplies, such as . . .
   - Use of bandsaws, drill presses, hand tools, etc.
   - Procedures for clamping and gluing materials
   - How and where to apply finishes
   - Storage of student developed materials (overnight, when drying, etc.)
   - Other
3. Provide time for the fabrication of the new designs
4. If time is available, show the class examples of industrial design materials (such as examples of solid modeling projects that come with CAD software or actual items from local industries)

24-26 Conduct formal presentations, allowing the students to describe their new designs to an appropriate audience for final approval

1. Allow time for the students to create handouts, PowerPoint slides, or related media for their presentations
2. Perhaps invite school administrators or other faculty to attend the session
3. Have the students to "practice" their presentations (especially if a small group will be presenting technical information)
4. Determine the sequence (order) for the presentations
5. Run the scheduled presentations, perhaps videotaping the talks for future reference or to provide constructive feedback to the students

27-30 Apply and review the problem solving and design process

1. Collect all materials for evaluation
2. Identify instructional videos that might be used to highlight "excellence" in design and problem solving and show them to the class
3. Present innovative examples of technological problem solving and design work that did not come up in the unit . . . . perhaps integrating examples of R&D efforts from disciplines such as agriculture and medicine

Day Instructional Outline (Lessons / Activities / Notes)

4. Conclude the unit with a formal evaluation
5. Clean-up the facility as needed at the end of the unit
   Instructor's note: If your school uses a middle school format, this may be the last day of the Technology course for the academic year for the students

Evaluation

Students may be evaluated on these actions and related criteria . . . .

- ✔ Participation in classroom and laboratory activities
- ✔ Research into assigned themes / topics
- ✔ Completion of initial design forms or handouts
- ✔ Sketches and engineering drawings
- ✔ Formal technical illustrations and related documentation
- ✔ Models (mock-ups of original designs)
- ✔ Preliminary and formal presentations
- ✔ Ability to follow a structured technological problem solving process
- ✔ Quality of a final solution
- ✔ Scores on teacher-created tests and quizzes

Unit 5 / 12 Days

Manufacturing Technology

Humans have always built items to make their life easier. Early products (clothing, furniture, children's toys, etc.) were built exclusively for personal use. Later manufacturing systems were developed to mass produce goods for an ever-widening market. Today's automated systems allow for safe, efficient, high-quality production with limited resources. Examples of advanced manufacturing applications in Indiana include automobile and electronics manufacturing, aerospace technology, robotics, engineering and design technology, production of medical devices (orthopedics, etc.), pharmaceutical manufacturing, and nanotechnology.

The term "manufacturing" includes all activities that change the form of physical resources (thereby adding value to the material). Initially, natural resources are obtained through mining, drilling, harvesting, or a related activity. The raw materials are then changed into industrial or standard stock by primary production actions such as smelting, chemical reactions, electrolysis, and mechanical processing. Examples of standard stock items include plywood, ingots and steel sheets, metal rods, ceramic powders, and plastic pellets. Each of these items are then further processed by secondary processing techniques into finished products.

An understanding of manufacturing requires people to have a basic grasp of material processing technology, or the knowledge of materials and processing techniques. The concepts of material science can be divided into four types of physical resources: metallic, ceramic, polymeric, and composite; and their mechanical, physical, chemical, thermal, electrical, magnetic, acoustical, and optical properties.

Manufacturing also involves the entrepreneurial actions typical of commercializing product suggestions. Manufacturers develop enterprises (i.e., companies) which plan, organize, direct, and control the events which convert product ideas into marketable products (such as durable or non-durable goods). A study of the designing, manufacturing, and marketing efforts also involves the personnel and financial resources required by the enterprises.

During this Technology experience, it is suggested that the students learn about both processing techniques and mass production systems. As you might have noticed, students have been introduced to material science in Unit #3 on Resources. Since this unit may be implemented one school year later (either in the middle school or junior high format) it might be a good time to review the previously covered topics and then build on that content. Also time is allotted for a more thorough review of available laboratory equipment and resources. A production run might be included in this unit, or in Unit #9 (refer to that section for additional information related to technological systems).

Objectives

Upon completing this unit each student will be able to:

- ✔ Define manufacturing
- ✔ Differentiate among the numerous types of manufacturing processes used to change materials into products
- ✔ List and describe the four basic types of materials
- ✔ Describe the basic properties of materials
- ✔ Safely use equipment and tools in the manufacturing facility
- ✔ Identify the major activities involved in designing, engineering, producing, and marketing products
- ✔ Produce a simple manufactured product using common tools
- ✔ Cite examples of manufacturing activities in the community / region
- ✔ Produce a product using a manufacturing production system (optional)

Proposed Schedule For The Unit

Day	Content / Activities
1-2	Introduce the basics of manufacturing technology
3-5	Explore manufacturing processing techniques
6-8	Develop and test engineered materials
9-10	Cover the planning phase of production operations
11-12	Conclude the unit with a laboratory-based production activity

Outline For Unit #5

Day	Instructional Outline (Lessons / Activities / Notes)
1-2	Start the unit by introducing the basics of manufacturing technology 1. Define terms such as manufacturing, mass production, quality, etc. 2. Explore examples of consumer products in the classroom (i.e., where was the furniture made, what types of materials are included in clothing, what type of finish was applied to cabinetry, what “natural” materials can be found in physical items, etc.?) 3. Divide the class into small teams and have each group “reverse engineer” a simple product . . . . ● Use simple products that have 3-8 parts (toothbrush, ink pen, stapler, a school backpack, etc.) ● Try to select products that include a variety of materials

Day Instructional Outline (Lessons / Activities / Notes)

- Reverse engineering means trying to figure out how the original components where fabricated and the order of assembly
- Have the students document these production details on an Operation Process Chart

4. Complete the introductory segment with a review of the three types of manufacturing systems . . . custom, intermittent (batch), and mass production
   - Identify local firms and determine which type of manufacturing they use and trace their origin (in other words, determine which regions of the world supply the resources that are used locally)
   - Refer back to the reserve engineered products, and identify the techniques used to produce them (for a mass market)
   - Ask the students to identify items that they have custom produced in the Technology course or at home

3-5 Introduce material processing techniques with the production of a multi-material product (e.g., a desktop organizer, toy, Holiday gift, novelty item for the school, etc.)

1. Select one or more products that students can build within 2-3 class periods
2. Assembly the resources required to build the items
3. Review the safety guidelines necessary for the machinery, equipment, or tools that will be used
4. Identify the processing techniques involved in building the product(s)
5. Schedule the manufacturing work so that students can rotate through the stations in the proper sequence but with minimal backups at each station

6-8 Implement a lesson on material testing / evaluation

1. Use examples of familiar consumer products to emphasize the importance of product testing, such as . . . .
   - Testing the strength of seat belts
   - Evaluating if the legs of a chair or table are strong and sturdy enough
   - Determining if hinges, lids, flaps, and door knobs will function properly over an anticipated lifetime
   - Examining the shelf life or “freshness date” of a manufactured item
   - Testing the rigidity of materials
   - Reviewing if a waterproof coating is sufficient on rain wear
   - Testing backpacks to see if they can hold an acceptable load (since most students in the Technology class will be hauling a heavy pack to class each day)
2. Set up a series of material tests, such as evaluating tensile strength or testing a bonding (gluing or nailing) technique

Day Instructional Outline (Lessons / Activities / Notes)

3. Have the students chart the data from their tests on a line or bar graph
   Note: This activity provides direct links to science (physics and chemistry) and mathematics

9-10 Cover the paperwork required to plan production operations for new products

1. Introduce the proper means of completing standard planning forms such as Operation Sheets, Flow Process Charts, Operation Process Charts, and Flow Diagrams
2. Select several consumer goods that "could" be built in your facility and that have 4-8 unique parts
3. Outline the resources in your manufacturing lab that would be required to fabricate and assemble the items
4. Challenge the students to develop an Operation Process Chart for one of the products (hopefully a variety of products can be documented)
5. Have students representing each different product describe how they might recommend that the item be fabricated and assembled

11-12 Conclude the unit with a production activity

1. Set-up a simple production line a assemble one of the products documented in the previous classes

   OR

   If a laboratory-based activity is scheduled for later in the course, use a movie of production technology to highlight modern manufacturing
2. Review the role of different staff seen or used during the production operations (thus analyzing talent and skill requirements)
3. Give a short quiz or test to evaluate what students have learned during the unit on manufacturing technology

Evaluation

Students may be evaluated on these actions and related criteria . . . .

- ✔ Participation during classroom and laboratory activities
- ✔ Completion of classroom or laboratory worksheets
- ✔ Review of material science and processing techniques
- ✔ Accuracy when developing production planning paperwork
- ✔ Participation in small group activities
- ✔ Ability to use machinery and tools
- ✔ Scores on a teacher-created quiz or test

Unit 6 / 12 Days

Communication & Information Technology

Communication is a basic human activity involving the exchange of ideas and information. Much communication is non-technical, as when people discuss topics in person or signal others by waving their arms. To be considered communication technology, a technical means must be used to extend the human abilities when communicating. Cameras, printing presses, cellular telephones, radios, computers, and MP3 players are a few of the common devices used to help us communicate with others. However, the study of communication technology is not the study of "gadgets" for their own sake. Rather, it is the study of hardware and systems used to process and transmit information. In Indiana that includes software development, network administration, radio and TV production, and similar fields. These are several examples of how technologies are used to develop and assemble information into specific media that inform, persuade, educate, and entertain others.

Typically, communication and information systems involve the formation and transmission of messages through these basic steps . . . .

- Designing / developing the message
- Identifying the best media for the intended audience
- Preparing to and producing the message
- Delivering (transmitting) the message
- Evaluating the messages for effectiveness

Communication systems can be divided into two broad categories, the types of media that we see (i.e., graphic) versus media that we both see and hear (i.e., electronic communication). Graphic communication systems are widely used in producing visual media such as published, printed, and photographic materials. Commercial broadcasting, telecommunication, and information processing networks require electronic media or signals when transferring ideas, data, and messages.

Both of these systems use the steps listed above when designing, producing, and delivering messages. And, until recent decades, the specific actions would differ considerably (e.g., a telephone is vastly different than a printing press). But almost all media today is based on digital technologies. This means that computers now handle many of the steps that formally required different gadgets or equipment.

This unit is designed to give the students an opportunity to study the steps in producing media. The specific activities should have a direct link to instruction throughout the Technology experience. For instance, the use of digital cameras or a desktop publishing software might be introduced during this unit with the goal of using those technologies later in the course. Or, it might be a good time to develop the advertisements or packaging for the products built during the manufacturing unit.

Objectives

Upon completing this unit each student will be able to:

- ✔ Define and describe communication technology
- ✔ Identify two broad categories of modern communication systems
- ✔ Identify the common components of information technologies using a model of the communication process
- ✔ Produce a simple visual media using a graphic communication system
- ✔ Produce a simple electronic message using a digital technology
- ✔ List ways that communication technology impacts our everyday lives
- ✔ Explain how broadcast media is controlled from both a technical and societal perspective

Proposed Schedule For The Unit

Day	Content / Activities
1	Introduce the concepts of communication and information technology
2	Explore the impacts of modern communication technology
3-5	Have the students prepare visual (print) media
6-12	Cover the development and production of electronic messages

Outline For Unit #6

Day	Instructional Outline (Lessons / Activities / Notes)
1	Introduce the unit by covering the nature of information and communication technology 1. In a technological world, communication is used for . . . . ● Education ● Information ● Persuasion ● Entertainment ● Other 2. Explain communication with a systems model that would typically include these elements ● Sender ● Encoding techniques ● Transmission media (or channel) ● Decoding techniques ● Receiver

Day Instructional Outline (Lessons / Activities / Notes)

- Feedback (direct or delayed)
- Interference
- Impacts / consequences

3. Describe how technical means (or what we simply call "modern technology") are used to "extend" our human senses, with these and other examples . . .
   - Vision: Eye glasses, telephoto lenses, night vision systems, etc.
   - Smell: Smoke detector
   - Touch: Sensors in elevator doors, actuators, etc.
   - Taste: Litmus testers
   - Sound: Hearing aids, P.A. systems, stereo equipment, etc.
4. Identify examples of communication technology in the classroom
   - Educational publications
   - Instructional media (videos, etc.)
   - Audio and video equipment
   - Computer networks
   - Other
5 Note the ways that communication technology impacts our everyday lives
   - Entertainment (TV, radio, motion pictures, computer games, etc.)
   - Access to information (library books, Internet, databases, etc.)
   - Staying "in touch" with family and friends (phones, mail, etc.)
   - Education (projectors, textbooks, newspapers, etc.)
   - Commerce (electronic banking, credit cards, publishing, etc.)
   - Hobbies (music, surfing the Internet, photography, etc.)
6. Have the students keep a 24-hour log of all communication devices and media they use (and expect the students to bring back very long lists!)

2. Explore the daily impacts of communication technologies
   1. Review the results of the 24-log, noting the variety of devices and systems
   2. Survey the class to explore their favorite . . . . .
      - TV programs
      - Video games
      - Radio stations
      - Books or magazines
      - Movies
      - Other
   3. Show a video related to communication systems . . . such as a program on the impacts of communication systems or how the Internet works

3-5 Have the students develop and print graphic media (i.e., a flyer, brochure, poster, banner, or similar item)
   1. Identify a topic or theme for a piece of media that can be easily

Day Instructional Outline (Lessons / Activities / Notes)

produced in your classroom or laboratory, such as a. . . .

- Brochure about the program at your school district's high school (grades 9-12) Technology Education program
- Flyer about an up-coming school event (dance, concert, conference, meeting, etc.)
- Banner promoting the study of technology for the cafeteria, library, or main hallway
- Packaging insert for a consumer product built during the manufacturing unit in your Technology course
- Greeting cards based on a birthday or "congratulations" theme that also includes the school's logo or mascot
- Point-of-purchase display stand (for a department project)
- Award certificates for participation in band, athletics, or student clubs

2. Review the hardware and software available for students during this desktop publishing (DTP) activity
3. Have the students, individually or in small teams, follow a structured design process when developing their flyer / brochure / media
   - Highlight the importance of "good" graphic layout (balance, form, etc.)
   - Discuss the use of various fonts (typestyles) in the media
   - Review the use of color in print media, whether printing on bright paper or using colorful clip-art in the media
   - Even though the work will likely be produced with a color printer at a DTP station, explain the process of color separation (i.e., assume the developed media were to be reproduced on multi-color printing presses)
4. Produce the materials in the classroom or laboratory
   Instructional note: Language arts skills will be required throughout this assignment, so highlight the links to writing, spelling, etc.
5. Schedule a "show and tell" period on the last day of this activity so that the students can explain their designs and outline the steps required to prepare the media

6-12 Cover the development and production of electronic media

1. Cite examples of electronic media and systems used in daily life
2. Refer to a standard model of the communication process when highlighting the sender-channel-receiver actions, and include the encoding and decoding phases of electronic media
3. Plan some type of media that can be videotaped or developed using animation software, such as . . . .
   - Developing a 30-second TV or radio commercial for a consumer product
   - Creating a promotional video for a musical group in the school

Day Instructional Outline (Lessons / Activities / Notes)

- Creating a “how to” video to show others how to use a digital camera, printing press, or flatbed scanner
- Preparing an instructional video on how to screen process print a new design on a T-shirt
- Recording a video inventory of the school’s T.E. facilities (equipment, supplies, library resources, etc.)
- Other

4. Follow this sequence in planning the media . . .
   a. Have teams assess the audience (i.e., their interests, age level, likely level of knowledge of the subject / topic, viewing patterns, etc.)
   b. Use notes from the audience assessment activity to plan the media
   c. Prepare blank storyboarding forms for the student to develop their media
5. Demonstrate the equipment that will be required for the activity
6. Have the students plan, produce, and assemble a video or animation feature
7. Provide time the last day of the unit for the teams to show their completed productions to others in the class
   a. If time permits, show a video related to the Internet, broadcasting, or modern motion picture production
   b. Use a formal means of evaluation to conclude the unit

Evaluation

Students may be evaluated on these actions and related criteria . . . .

- ✔ Involvement during classroom and laboratory activities
- ✔ Completion of a 24-hour log form (i.e., usage of communication media)
- ✔ Completion of design forms or handouts
- ✔ Production of print media
- ✔ Participation in small group activities
- ✔ Audience assessment related to an assigned themes / topics
- ✔ Development of the storyboard forms
- ✔ Ability to use required equipment
- ✔ Quality of a video or animated feature
- ✔ Scores on teacher-created tests and quizzes

Unit 7 / 12 Days

Transportation Technology

Transportation involves the movement of people and goods in one or more of four environments . . . . . land, water, air, and space. Often the travel is related to commerce (trucking, cargo ships, taxi service, etc.). Sometimes the sole purpose is recreation. The need to move about freely is important in a global society.

The two "technical means" in transportation are vehicles and systems. People and cargo travel in vehicles, and then the vehicles travel via systems (such as interstate highways or on ships through canals and lock systems). The operations of a freight yard or harbor would also be considered a system in transportation. In Indiana, transportation is also related to warehousing and distribution, infrastructure, system design and management, logistics, and the storage of goods

Vehicles themselves also have technical sub-systems, including:

- Structure — Gives the vehicle its shape and protects the cargo or people
- Propulsion — Powers the vehicle
- Suspension — Supports the vehicle on its pathway (air, land, water)
- Guidance — Provides information necessary to operate / control the vehicle
- Control — Is the actual maneuvering of the vehicle at an appropriate speed and direction
- Support — Although not a part of an actual vehicle, support is often included in the discussion of vehicles due to the importance of fueling stations, maintenance facilities, and related function

An understanding of transportation systems is also important for today's citizens. People operate personal vehicles on roadways on a daily basic. At other times, passage is secured through the purchase of tickets (on buses, airplanes, etc.). The development and maintenance of many systems is dependent upon public support, so all students should learn about the rights-of-way they will use and fund.

Finally, some of society's major technological dilemmas are related to transportation. For instance, air pollution is linked to automobile exhausts and traffic congestion is a major problem in many communities. At the same time, the high cost of today's energy is due to the huge demand for petroleum required of the transportation sector. When studying transportation, these types of challenges should be covered as it is the future generations that must address these issues.

During this unit, students will develop vehicles for various environments. The importance of Unit #5 (manufacturing) and Unit #6 (communication) will be evident as mass produced vehicles navigate safely via different routes. Competitive races or trial runs over "treacherous" courses may become a popular part of the unit.

Objectives

Upon completing this unit each student will be able to:

- ✔ Describe transportation using a model of a technological system
- ✔ List the four common environments used for transportation
- ✔ Explain how technological developments change how goods and people are transported
- ✔ Cite examples of the technical sub-systems in various types of vehicles
- ✔ Design, build, and test simple vehicles
- ✔ Describe how transportation technologies have influenced the lifestyles of people and impacted the environment
- ✔ Specify a transportation vehicle or system for the future

Proposed Schedule For The Unit

Day	Content / Activities
1-2	Introduce the basic concepts of transportation technology
3-5	Challenge the students to design various types of vehicles
6-7	Explore the nature of transportation systems
8-12	Cover transportation and the future

Outline For Unit #7

Day	Instructional Outline (Lessons / Activities / Notes)

1 Introduce the basic concepts of transportation technology

1. Provide a standard definition of transportation technology
2. Common examples from the perspective of consumers / users . . . .
   - Personal automobile
   - School buses
   - Semi-tractor trailer (trucks)
   - Package delivery services
   - Railroads
   - Airlines
   - Race cars
   - Personal items (bicycles, skateboards, etc.)
   - Other
3. Explain transportation from a technology perspective (using appropriate terms and definitions)
   - Vehicles (land-based, intermodal, etc.)

Day Instructional Outline (Lessons / Activities / Notes)

- Guideways (roadways, railroad tracks, maglev track, etc.)
- Support facilities (gas stations, launch pads, etc.)

4. Describe the challenges associated with traveling in the four common environments of modern transportation
   - Land
   - Water / Marine
   - Air / Atmospheric
   - Space

   Instructor's Note: Various textbooks use different terms, so refer to each of these four using phrases found in your class's instructional materials
5. Explain the development of vehicles and the technical sub-systems common of each vehicle
   - Structure
   - Propulsion
   - Suspension
   - Guidance
   - Control
   - Support
6. Review the commercial (business) applications of transportation
   - Passenger
   - Cargo
   - Combination

   Instructor's Note: As mentioned above different terms are used in technology textbooks for these concepts as well, as when physical items are called freight, commodities, cargo, or payloads
7. Identify examples of modern transportation "systems"
   - Highways, rail lines, pipelines, race tracks, etc. on land
   - Canals, rivers and lock systems, ocean lanes, etc. on water:
   - Air traffic control route through the earth's atmosphere
   - Tracking systems, launch systems, etc. related to space travel
8. Use a short video or CD-ROM related to transportation systems to highlight this exciting topic

3-5 Challenge the students to design various types of vehicles

1. Select a challenge for the students, such as . . .
   - Model trucks that can "pull" the greatest load (using simple batter-powered motors)
   - Race cars built with Lego. Fishertechnic, K-Nex, or similar kits (for a flat, dry course)
   - A rubber band powered vehicle that will go the farthest
   - Model boats designed for holding the greatest capacity / load
   - A monorail vehicle that will follow a suspended route the best

Day Instructional Outline (Lessons / Activities / Notes)

- Sailboats that will cross a large tank or basin the fastest
- Maglev vehicles that will "win" a gravity-powered race
- Model aircraft (or glider) that will stay aloft the longest
- A glider that will fly the greatest distance
- Water-powered model rocket that will fly the highest
- TSA events (Formula 1 racer or CO2 cars, etc.)

2. Collect the materials required for the challenge (based on the number of teams and nature of the vehicles)
3. Organize the students, individually or in small teams, reviewing guidelines and testing procedures (including demonstrating how the guideway will be arranged for the final trial, if appropriate)
4. Review safety rules for any machinery or tools that will be required
5. Supervise the students as the vehicles are built and tested
6. Conduct the race or event (noting the reason that the better designs excelled versus other vehicles that did not perform as well)
7. Have the students calculate the speed (velocity) of their vehicles
   Note: Assuming that a vehicle going 60 MPH travels 1 mile (5280 feet) in 60 seconds, determine how long each vehicle takes to travel a standard distance such as 10 feet, and extrapolate to find the velocity
8. Collect the materials at the end of the trials to evaluate the student's work

6-7 Explore the nature of transportation systems

1. Cite examples of "public" versus "private" commercial systems in the community (e.g., an interstate highway or NASA, as compared to a private racetrack in the community or a taxi service in the region)
2. Use a transportation=based software (such as SimCity, Traffic Planner, Microsoft Train Simulator, etc.) or a video to highlight the importance of the business aspects of transportation . . .
   - Economics of scale
   - Schedules
   - Loading and unloading procedures
   - Navigation
   - Traffic flow
   - Control or regulation (over-sight) of the system

   Instructional note: Examples of transportation networks can be found on the Internet along with game sites that feature various types of challenges
3. As students become acquainted with the systems as them how they might improve the efficiency of their network / operation / system

8-12 Explore the future of personal transportation by having the students model a vehicle for land, air, or marine-based travel

1. Identify a land-, air-, or water-based technology that has yet to be featured

Day Instructional Outline (Lessons / Activities / Notes)

during this unit and challenge the students to design a personal vehicle for that environment
2. Collect instructional materials (library books, reference manuals, WWW sites, models, etc.) that will help the students during their research and design work
3. Demonstrate the appropriate ways to complete design worksheets, planning paperwork and / or illustrations
4. Have the students identify the technical sub-systems for their vehicle and specify those details (for instance, the propulsion system might include an internal combustion engine, electrical power, wind, etc.)
5. Supervise the students as they develop models of the new vehicles
6. Schedule a "show and tell" period for the students to describe their ideas
7. Critique the designs for practicality (economics, function, etc.) and, along with the students, determine how soon a vehicle of that type might end up on the market
8. Collect all materials for evaluation
9. If appropriate, use a quiz or test at the conclusion of this unit to evaluate the student's understanding of transportation

Evaluation

Students may be evaluated on these actions and related criteria . . . .

- ✔ Participation during classroom and laboratory activities
- ✔ Knowledge of basic terms and technological concepts
- ✔ Completion of design worksheets or forms
- ✔ Production of vehicles (models, mock-ups, etc.)
- ✔ Participation in small group activities
- ✔ Results in the race / challenge
- ✔ Participation during the study of a transportation system
- ✔ Ability to use transportation hardware and software
- ✔ Scores on teacher-created tests and quizzes

Unit 8 / 12 Days

Construction Technology

Construction dates back to when people first needed shelter and protection from their environment. The earliest form of construction may have been digging a hole or using stones and rocks to adapt a cave or overhanging cliff for safety. As early people increased their knowledge of their surroundings, they were able to build structures to make life more comfortable. Native Americans built teepees that could be moved easily (like the tents used by nomads in desert regions. The technological activity of creating a structure on a site is now known simply as construction. The vast body of knowledge of how to use resources, efficient management, and techniques to build something on a specific site is called construction technology.

Construction technology is used to build the structures that help people to work, live, and play in an efficient environment. Examples of structures include factories, office buildings, schools, roads, airports, railroads, water lines, and sewers. When people reside or work inside the structure the terms residential, commercial, and industrial are used to describe the structure. When the building project results in something that will not involve inhabitants, the term civil construction is applied. Highway bridges, water towers, and dams would be examples of civil construction.

This unit is designed to give the students an overview of construction technology. Students will be introduced to the various stages of construction to meet human needs. The common stages are as follows:

- Obtaining land
- Planning and designing the structure
- Preparing the site
- Building structures (foundation work, framing, roofing, etc.)
- Installing utilities, mechanical systems, and other services
- Completing the site (landscaping)

Objectives

Upon completing this unit each student will be able to:

- ✔ Define and describe construction as a technological system
- ✔ Describe how construction satisfies the needs of society
- ✔ Identify various types of residential, commercial, and civil structures
- ✔ List some of the major contributions to construction technology made by the ancient Egyptians, Greeks, and Romans
- ✔ Explain the common steps in building a structure on a given site
- ✔ Interpret a topographical map
- ✔ Describe the interrelationship of construction and community development

Proposed Schedule For The Unit

Day	Content / Activities
1-2	Introduce construction technology
3-5	Review famous structures throughout history
6-7	Cover how new construction projects are design and documented
8-10	Have the students design a simple house, garage, etc. for a site
11-12	Review modeling techniques by having the students create a wall section of an exterior wall

Outline For Unit #8

Day — Instructional Outline (Lessons / Activities / Notes)

1-2 Introduce construction technologies at the beginning of the unit

1. Cover the key terms related to construction (building, structure, etc.)
2. Emphasize that construction involves building something on a site versus manufacturing that involves building something and then moving it out to the consumer who will be using it
3. Cover the major steps in developing a structure on a site
   - Establishing a need / desire for a proposed project
   - Funding the proposed project
   - Designing structures
   - Managing the construction project
   - Completing work below ground
   - Building the superstructure (i.e., work above grade level)
   - Completing the project (landscaping, transfer of ownership, etc.)
4. Describe the common steps in the construction process
   - Selecting the site
   - Preparing the site
   - Building the foundation
   - Building and enclosing the superstructure (framing, etc.)
   - Installing utilities, mechanical systems, etc.
   - Finishing the project (landscaping and other exterior work)
5. Provide numerous examples of structures
   - Types of buildings
     - ✔ Residential
     - ✔ Commercial (often called light industrial or institutional)
     - ✔ Industrial

Day Instructional Outline (Lessons / Activities / Notes)

- Various types of civil structures
  - ✔ Transportation (roads, rail lines, runways, bridges, pipelines, etc.)
  - ✔ Utility (communication and electrical towers, relay stations, sewers, water towers, petroleum tank farms, etc.)
  - ✔ Mass superstructures (dams, levees, etc.)
  - ✔ Other (monuments, temporary structures, etc.)

6. Have each student create a floor plan of a different room in the school building (or of another familiar structure such as their house or a local public building)
   - Use graph paper for the plans
   - Be sure the illustrations are completed in an appropriate scale
   - Include key features (windows, doors, etc.)
   - Calculate square footage and / or volumes of each room
7. As the drawings are completed, review the criteria for the structure, including the function, safety issues, economics, and aesthetics
   Instructional note: Highlight the mathematical precision of construction planning, as the illustrations must be developed with the proper dimensions and to the optimal scale . . . while the drawings define the volume and nature of physical space

3-5 Review famous structures throughout history

1. Introduce the work of architects, civil engineers, and builders through the study of famous project and structures (Superdome, Panama Canal, Empire State Building, Washington Monument, Golden Gate Bridge, the Gateway Arch at St. Louis, Frank Lloyd Wright's home called Fallingwater, Sears Tower, etc.)
2. Have each student select a different structure and research as many details as possible about the design, designers, contractors, etc.
3. Provide cardboard, glue, tools, etc. so that students can make a representative model of their assigned structure
4. Each student should calculate (should the information not be readily available) the height, volume, footprint, etc. of their structure for the report
5. Have each member of the class give a brief presentation over their construction project using their model, print-outs off the Internet, posters, textbooks, etc.)
   Instructional note: Naturally this assignment relates to social studies and history, so work in collaboration with those teachers in your school to make this activity a success
6. Collect the materials for evaluation

6-7 Cover how new construction projects are designed and documented

1. Point how the role the client(s) and these professionals play in the

Day Instructional Outline (Lessons / Activities / Notes)

construction planning and design process:
- Client
- Architects
- Engineers
- Contractors
- Drafters
- Surveyors
- Other

2. Describe the common planning considerations:
   - Client's needs
   - Site
   - Climate (physical environment)
   - Construction techniques
   - Funding
3. Note the added complexities of planning a civil project (dams, highways, pipelines, rail lines, towers, etc.)
   - Eminent domain guidelines
   - Access to capital (possibly through public monies)
   - Environmental impact
   - Other
4. Initiate a project planning process (that will run the rest of Unit #8) for a small residential structure . . . . on an actual plot of land near the school or an imaginary site in a new neighborhood
   - All construction follows a series of steps, so outline the guidelines for the next 3-5 class periods
   - Provide a plot plan (i.e., contour map) of a site
   - Have the students determine required site work, such as grading and leveling
   - Specify the type of foundation desired

8-10 Have the students design a simple house, garage, etc. for a site
1. Demonstrate how floor plans are developed
   - Identify basic dimensions (square footage) for common entry areas, specific rooms, and other spaces
   - Specify the level of detail required . . . such as door and window schedules, utilities, etc.
2. Supervise the students as they develop the floor plan

11-12 Have the students create a wall section model of one exterior wall
1. Select one of the elevation views . . . with each student or team modeling a different wall
2. Have the students create a wall section of the superstructure with sticks,

Day Instructional Outline (Lessons / Activities / Notes)

posterboard or corrugated stock, styrofoam, toy building blocks, etc. (representing studs, headers, doorways, trusses, etc)

3. Ask the students to describe their structure using the documentation and model
4. Collect all materials for evaluation
5. Use a quiz or test to evaluate the student's knowledge of construction technology (if appropriate)

Evaluation

Students may be evaluated on these actions and related criteria . . . .

- ✔ Participation during classroom and laboratory activities
- ✔ Understanding of basic terms and construction concepts
- ✔ Completion of worksheets or forms
- ✔ Quality of paperwork and models of famous structures
- ✔ Design efforts (creativity, practicality, efficiency, etc.)
- ✔ Accuracy of calculations, dimensions, and related numerical data
- ✔ Quality of the wall section model
- ✔ Scores on teacher-created tests and quizzes

Unit 9 / 12 Days

Technology & Systems

Today, complex devices and equipment are used to alter information, materials, and energy. For instance, a personal computer is an elaborate "technological system" with a keyboard or disk drive for inputting information, a central processing unit to handle the data, and a printer as an output device. A home stereo unit may have a variety of input devices (radio, CD, MP3 player, etc.) and different types of speakers (or output devices) around the room. Systems are used to heat and cool buildings, track satellites, and operate assembly lines. In reality, it's difficult to find a technology that's NOT part of a larger system.

Further most systems are interrelated. For instance, communication systems (traffic control, navigation, radio links, etc.) are vital for successful transportation. Factories could not function without a routine delivery of raw materials or the distribution of finished products (all thanks to transportations systems). Of course, a factory is a constructed structure as are the radar antennas and radio towers used for electronic communication.

Technological systems have defined inputs, processes (or functions), and outputs, along with impacts / consequences. Earlier in this course guide we introduced topics such as production, communication, and transportation as systems. Using a systems approach, it is easier to review, describe, analyze, duplicate, and trouble-shoot a technology.

The concluding unit in the Technology class provides an opportunity for students to study modern technology from a system perspective. During the first few days of Unit #9, students will explore a device, process, or system in a way similar to the "how things work" books or videos. Then the class should participate in a culminating experience such as a production line or a broadcasting activity.

Other examples of collaborative activities might include:

- Organizing a major transportation unit related to space travel
- Building a new facility such as a greenhouse or an aquatic center
- Participation in a regional or national problem solving event
- Study of energy or power systems

Throughout this final unit, emphasize the vital relationship between people and technology in modern systems. For instance, it takes many complex systems aboard a commercial airliner to get the heavy plane (with all its passengers and cargo) off the ground. But it also takes dedicated, well-trained professionals to fly the plane. This group includes the pilots, flight engineer, navigator, air traffic controllers, and various support staff.

Objectives

Upon completing this unit each student will be able to:

- ✔ Define a technological device or endeavor using a systems model
- ✔ Describe how modern systems help enhance our quality of life
- ✔ Explain how a system functions
- ✔ Describe the interrelationship of people and technological systems
- ✔ Explain how a system functions

Proposed Schedule For The Unit

Day	Content / Activities
1	Introduce how technology is viewed with a systems model
2-5	Review a modern device, process, or system by challenging the students to research a modern technology and report about “how it works” to others in the class
6-7	Complete the planning phase for the “sample system” that will be studied during the remainder of the unit
8-12	Have the students build and / or participate in the operation of a system

Outline For Unit #9

Day	Instructional Outline (Lessons / Activities / Notes)
1	Review how technology is viewed using a systems model 1. Cover the key terms related to systems 2. Pace a emphasis on the areas of technology that have yet to be highlighted during the course (medical technology, agricultural production, energy and power systems, etc.) 3. Use a appropriate video to introduce the selected theme for the unit
2-5	Challenge the students to research a device or system and report about “how it works” to others in the class 1. Establish a list of devices or systems that could be assigned to each student, such as . . . ● The pump at a gas station ● A hydroelectric facility ● A kitchen appliance like a blender, toaster, or microwave ● An MP3 music player

Day Instructional Outline (Lessons / Activities / Notes)

- Local operations like the sewage treatment plant in the community
- How a dairy or bakery works
- An X-ray machine (or similar medical apparatus)

2. Assign a device or system to everyone in the class (by allowing each student to identify a topic or by randomly assigning the topics)
3. Provide sufficient research time so that the class can explore the topics in depth, using . . . .
   - Technology books or reference manuals in the library
   - An instructor's manual (if available)
   - Information from Internet sites
4. Outline how the students will be reporting their findings, either during a brief oral presentation, with pictures collected during the investigation phase, and / or through graphics created just for a formal presentation
5. Schedule and conduct the student presentations
   Instructional note: Be sure others in the class are taking notes during the presentations, as the details will likely be both interesting and informative

6-7 Complete the planning phase for the "sample system" that will be studied during the remainder of the unit

1. Have the students / teams complete planning paperwork (forms, drawings, etc.) as required for the activity
2. Identify key steps, elements, and / or components to support the main lesson being addressed by the activity

8-12 Build and operate the system as appropriate

1. Establish the technological system, setting-up hardware or software
2. Train the students for their intended roles (as operators, managers, etc.)
3. Use the system to process information, energy, or materials
4. Discuss the impacts of the device or system (today and in the future)
5. Conclude the unit with an appropriate evaluation over Unit #9 and the entire Technology experience

Evaluation

Students may be evaluated on these actions and related criteria . . . .

- ✔ Involvement during classroom and laboratory activities
- ✔ Knowledge of key terms and concepts
- ✔ Completion of forms or worksheets
- ✔ Presentation about a technological device or system
- ✔ Design efforts (creativity, practicality, efficiency, etc.)
- ✔ Scores on teacher-created tests and quizzes

Policy Notification Statement

It is the policy of the Indiana Department of Education not to discriminate on the basis of race, color, religion, sex, national origin, age, or disability, in its programs, activities, or employment policies as required by the Indiana Civil Rights Law (I.C. 22-9-1), Title VI and VII (Civil Rights Act of 1964), the Equal Pay Act of 1973, Title IX (Educational Amendments), Section 504 (Rehabilitation Act of 1973), and the Americans with Disabilities Act (42 USCS §12101,et. seq.).

Inquiries regarding compliance by the Indiana Department of Education with Title IX and other civil rights laws may be directed to the Human Resources Director, Indiana Department of Education, Room 229, State House, Indianapolis, IN 46204-2798, or by telephone to 317-232-6610, or the Director of the Office for Civil Rights, U.S. Department of Education, 111 North Canal Street, Suite 1053, Chicago, IL 60606-7204—Dr. Suellen Reed, State Superintendent of Public Instruction.